Project Thor

Team Members:
Adonay Pichardo
Jared Blanco
Josh Temel
Luke Boneburger

Faculty Advisor:
Dr. Sid Bhattacharyya

Client:
Dr. Amitabh Nag

Google Slides

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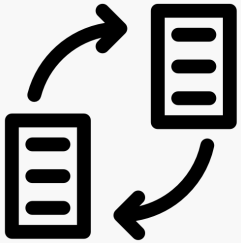
Motivation

- Natural phenomena in encryption
- Can the data support the production of non-deterministic random numbers
- Encrypt data with a process that incorporates lightning data

Goal

- Create web application that allows users to generate encryption keys with high-entropy, truly random data that is gathered from the study of lightning strikes.
- Spring 2022 Goal
    - finish development and refinement process and move into the testing and verification phase

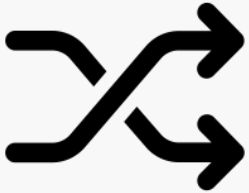
Key Features (1/2)



Feature 1: Automated Data Transfer

- Input: 1 lightning strike in ASCII format (every x seconds)
- Output: 1 lightning strike record inserted into database

The original data set will be provided to us via ASCII text files. Much of the data within this file is unusable due to its predictable nature. Only a few data types will be potentially useful for this project. Therefore, to make them more easily accessed and usable, the web application will automatically parse the relevant data from the ASCII files and add it into our working database from which the web application will be able to generate random numbers.



Feature 2: Random Number Generator

The web application, using the random data gathered in the database, will be able to algorithmically generate random numbers. These random numbers will be theoretically less predictable than those produced by pseudo-random number generators currently being used as the seed data being pulled from the database is considered to be random by nature.

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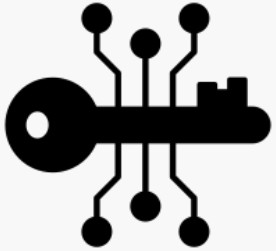
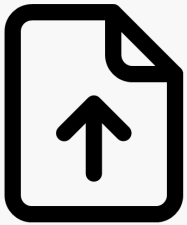
Key Features (2/2)



Feature 3: Create Encryption Keys

Users will be able to use our web application to create cryptographic keys. These keys will be generated using the random number generator mentioned above and should be very secure due to the fact that they were developed using numbers and data sets that have a higher degree of entropy (randomness) than those typically employed by other modern cryptographic algorithms.



Feature 4: File Upload for Encryption

Users will be able to use our web application to upload files from their local machines to be encrypted using modern encryption algorithms. The specific algorithms to be used are yet to be decided, but the user will have the option of using at least one, and possible more using a drop down menu. Additionally, the specific file formats we will accept are pdf and txt, but may also expand to include others.

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Novel Features

Feature 1: Collected Data

The original data set that will be collected, sorted, and transferred into our database is a novel feature to our project as it will have a degree of randomness inherent to it due to it being based directly from lightning. A natural phenomena that is highly abundant yet very unpredictable.

Technical Challenges

1. Automating raw data entry into the database. (Completed)
2. Creating a random number generator using multiple parameters drawn from the data set. (In Progress)
3. Integrating a strong encryption algorithm that uses our random number generator. (In Research)
4. Learning how to use the chosen website backend option. (Completed)
5. Learning about integrating backend to database. (Completed)
6. Prevent recreation of previously calculated numbers. (In Progress)

Milestone 1 - Feb 14

- Update Demos
- Update Documentation
- Create Problem Statement Documentation for Web Application
- Create Solution Documentation for Web Application
- Drafting Web Application Testing Documentation

Milestone 2 - Mar 21

- Perform Requirements Verification Testing
- Analyze Results of Web Application Testing
- Perform Metrics Testing

Milestone 3 - April 18

- Complete Final Showcase Poster
- Complete Final Showcase Ebook Page
- Complete Final Demo Update
- Complete Final Documentation Update
- Complete Documentation for Future Teams Interesting in Project

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